

# **U.S. Department of Energy Next Generation Natural Gas Vehicle (NGNGV) Engine & Vehicle Projects**

**NGVTF, April 14-15, 2004, Sacramento, California**

**National Renewable Energy Laboratory**

**Mike Frailey**

**Margo Melendez**

**Richard Parish**

**Jarett Zuboy**

**NGNGV is also supported by the South Coast Air Quality  
Management District and the California Energy Commission**



## Pre-NGNGV

Alternative Motor Fuels Act of 1988 (AMFA): Public law 100-494. Encouraged the development, production and demonstration of alternative motor fuels and AFVs.

Clean Fuel Fleet Program: Federal program requiring fleet purchase of Clean\_Fuel Vehicles beginning in 1988.

Intermodal Surface Transportation Efficiency Act of 1991 (ISTEA): Congestion Mitigation and Air Quality Improvement (CMAQ)

Energy Policy Act (EPACT): A broad ranging act requiring the purchase of AFVs by the federal fleet.

# NGNGV Program

Then... (2000)

NO<sub>x</sub> & PM standards- 4.0 & 0.1 g/bhp

NG R&D funding is flat/decline

NG vehicle sales flat/decline

Difficult business case

- Fleet

- OEM development

Federal incentives- transit bus

State (CA) incentive

- Carl Moyer

NGNGV established to coordinate R&D efforts

# NGNGV Program

## Workshops

Engine and vehicle OEMs, fleet operators, industry and trade associations, funding partners, utilities and fuel distributors, equipment suppliers, national labs and research groups, industry research groups, consultants and universities

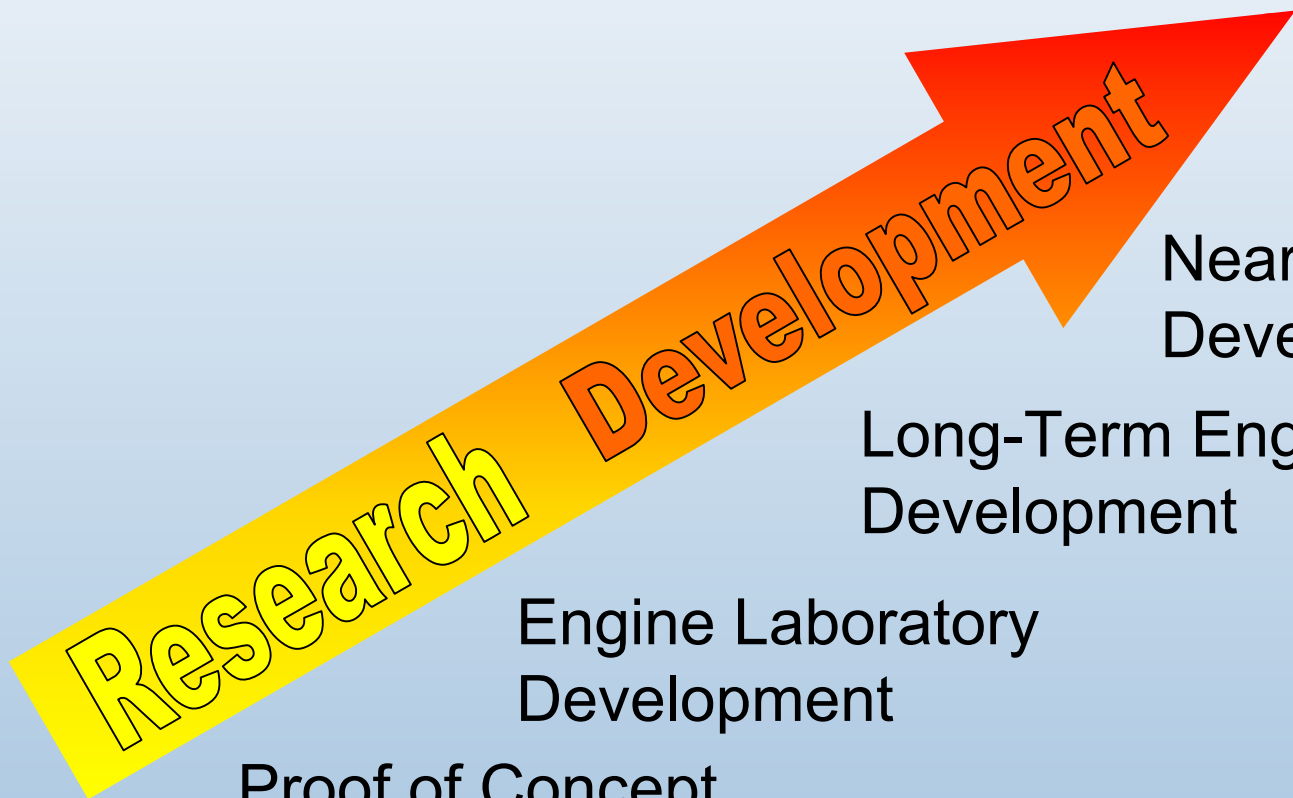
# NGNGV Program

## Workshop Results (for engines & vehicles)

- Engine R&D to meet *proposed* 2007/10 emission standards (0.5 NO<sub>x</sub>, 0.01 PM)
  - Lean-burn
  - Stoichiometric
  - Exhaust After-treatment
- Market Research: Identify & define best application
- Near-Term Engine/Vehicle needs exist right now!

# NGNGV Program

## Commercialization



Near-Term Engine/Vehicle Development

Long-Term Engine/Vehicle Development

Engine Laboratory Development

Proof of Concept

# NGNGV Program

Now... (2004)

NO<sub>x</sub> & PM standards- 2.5 NO<sub>x</sub> + nmHC, 0.1 PM

NG R&D funding flat/declining

NG engine/vehicle sales flat (domestically)

Difficult business case

Fleet

OEM development

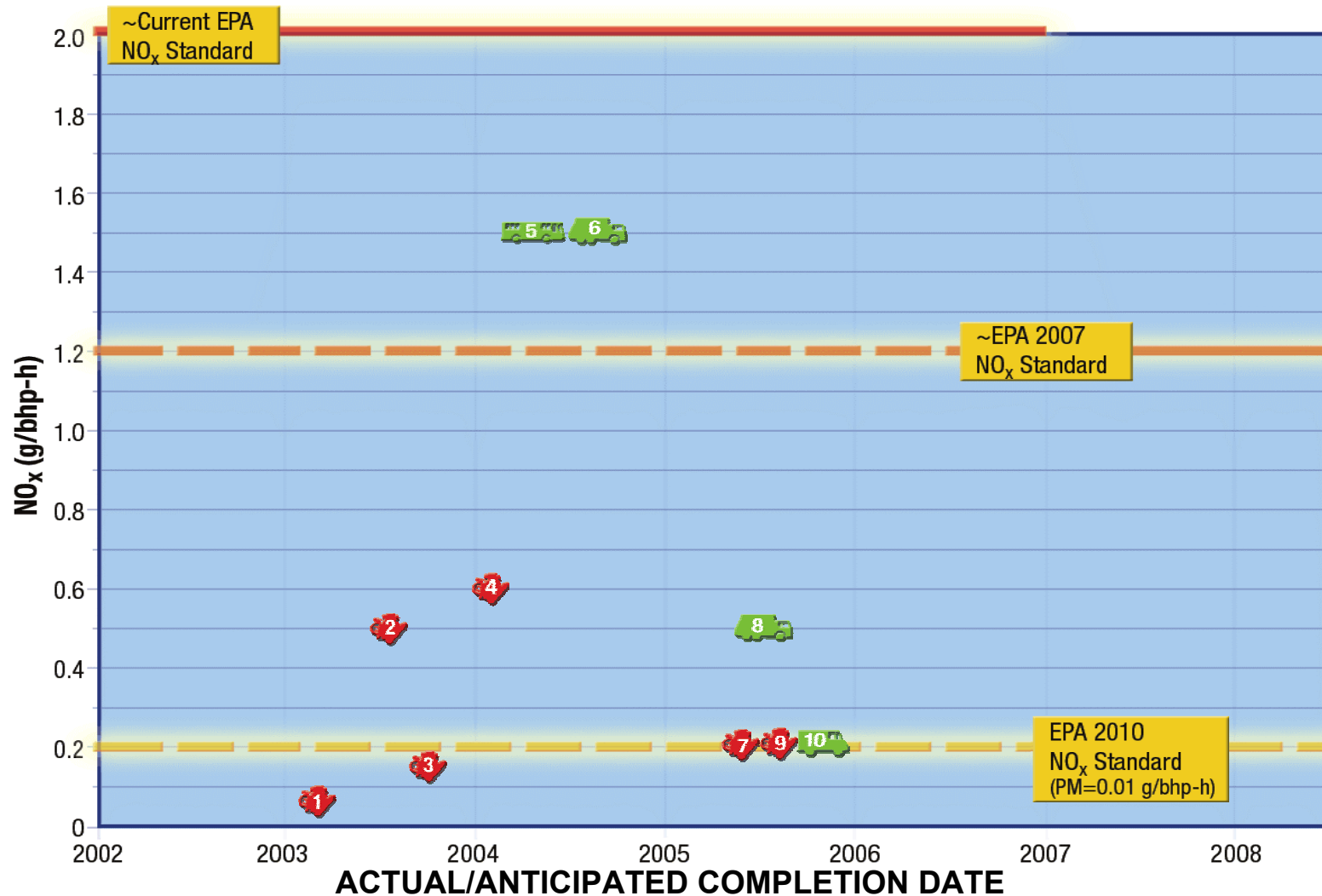
Emissions based incentives diminishing

# NGNGV Program

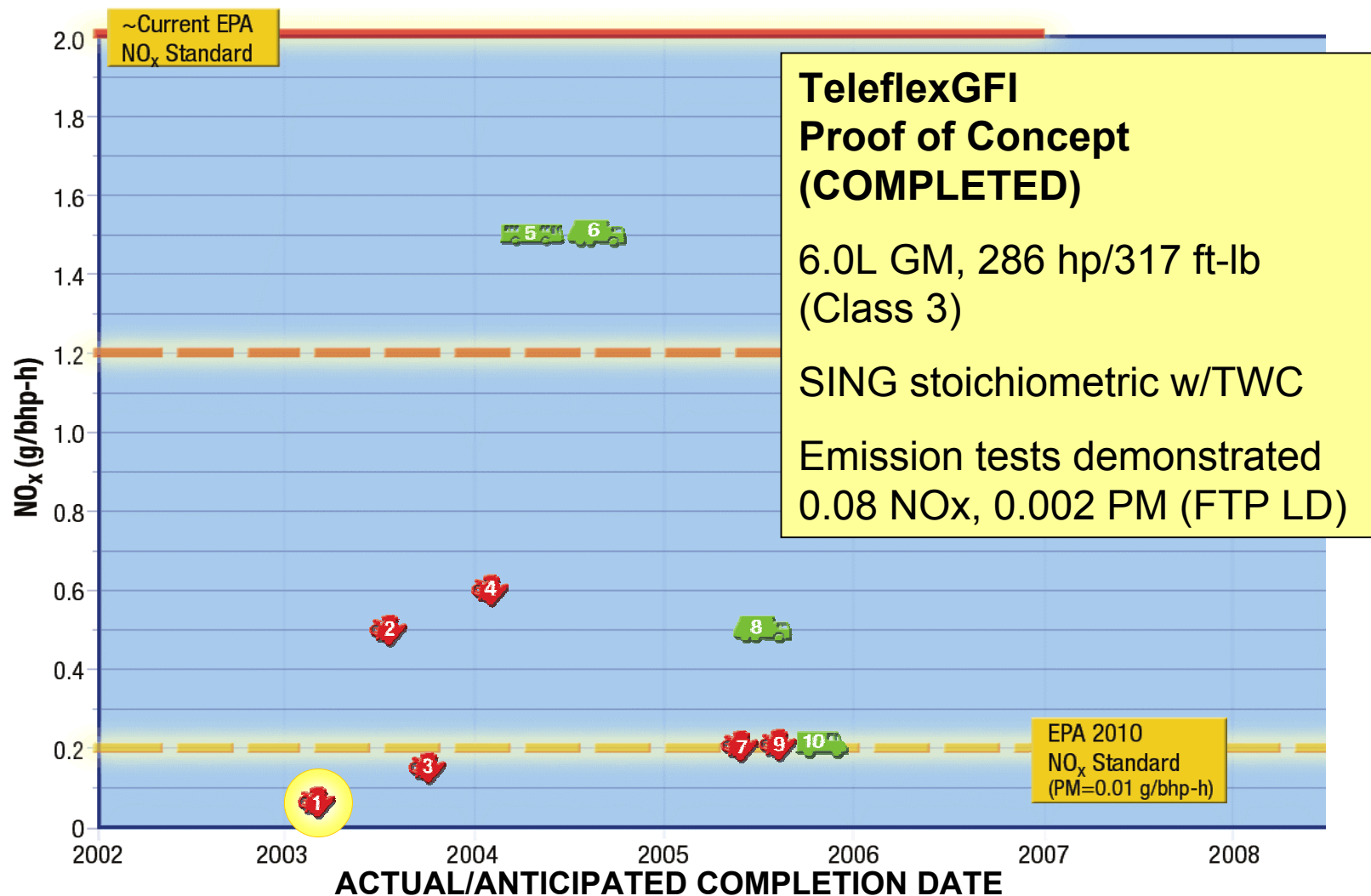




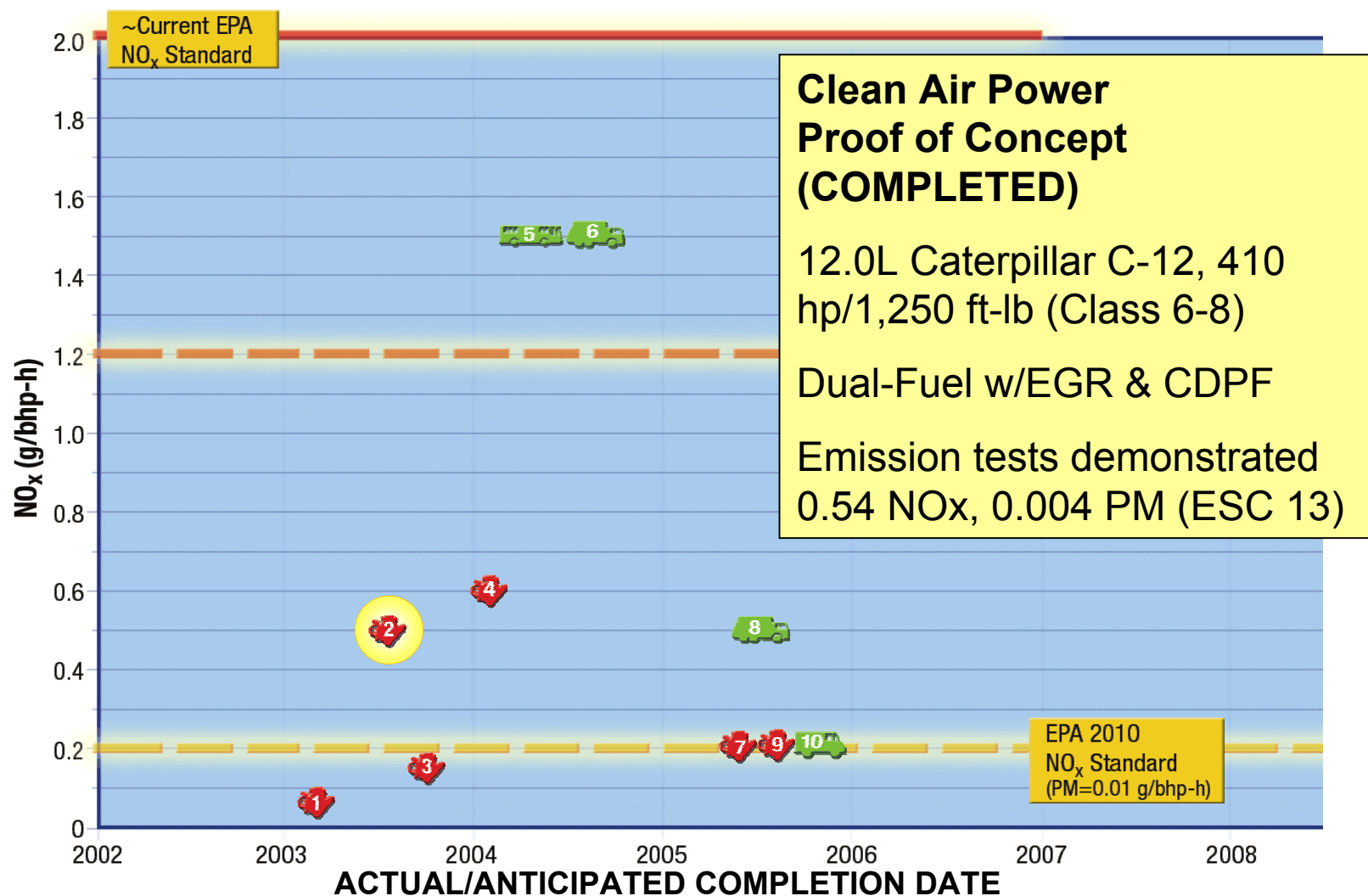
# NGNGV Projects



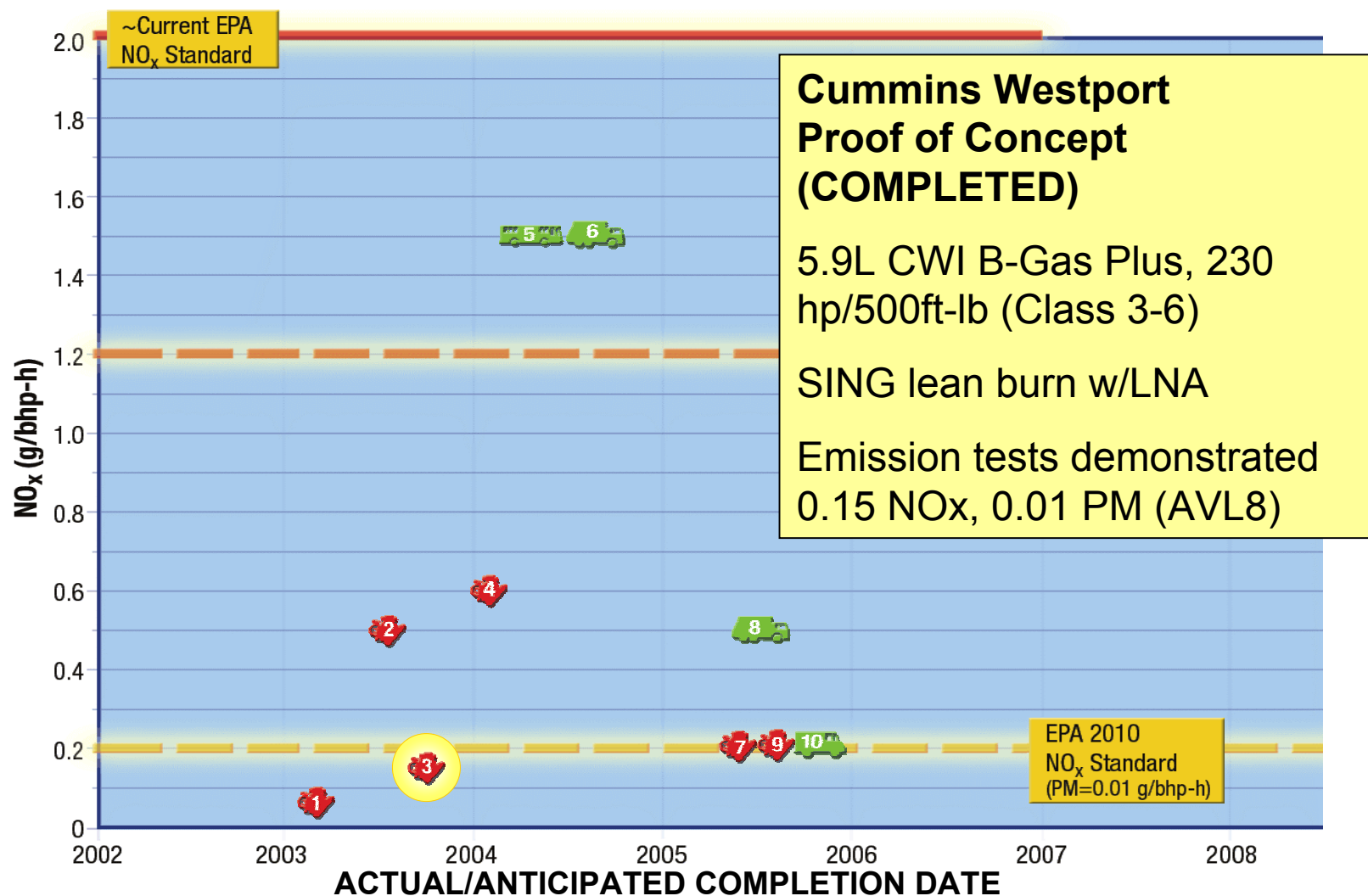
# NGNGV Projects



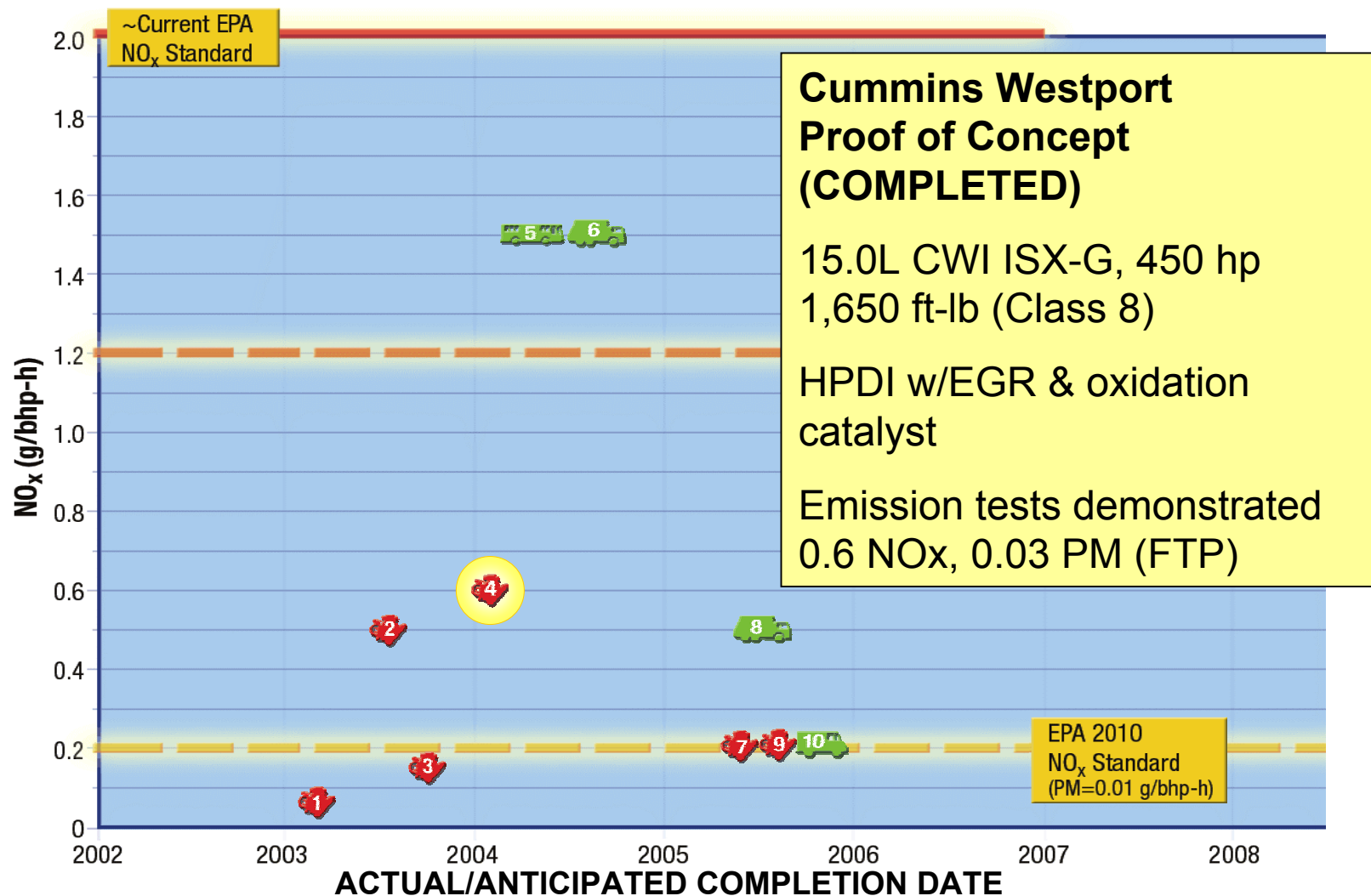
# NGNGV Projects



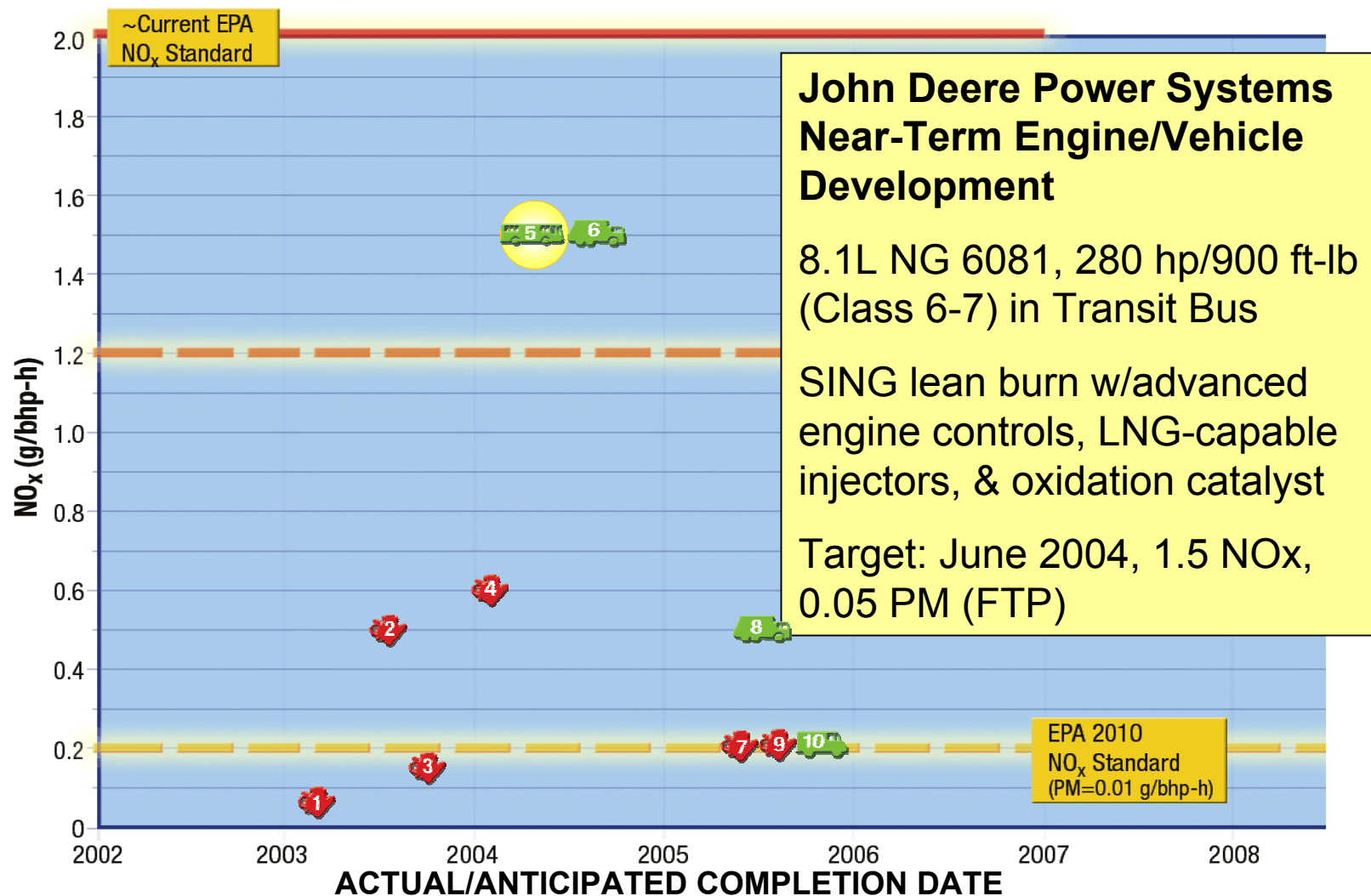
# NGNGV Projects



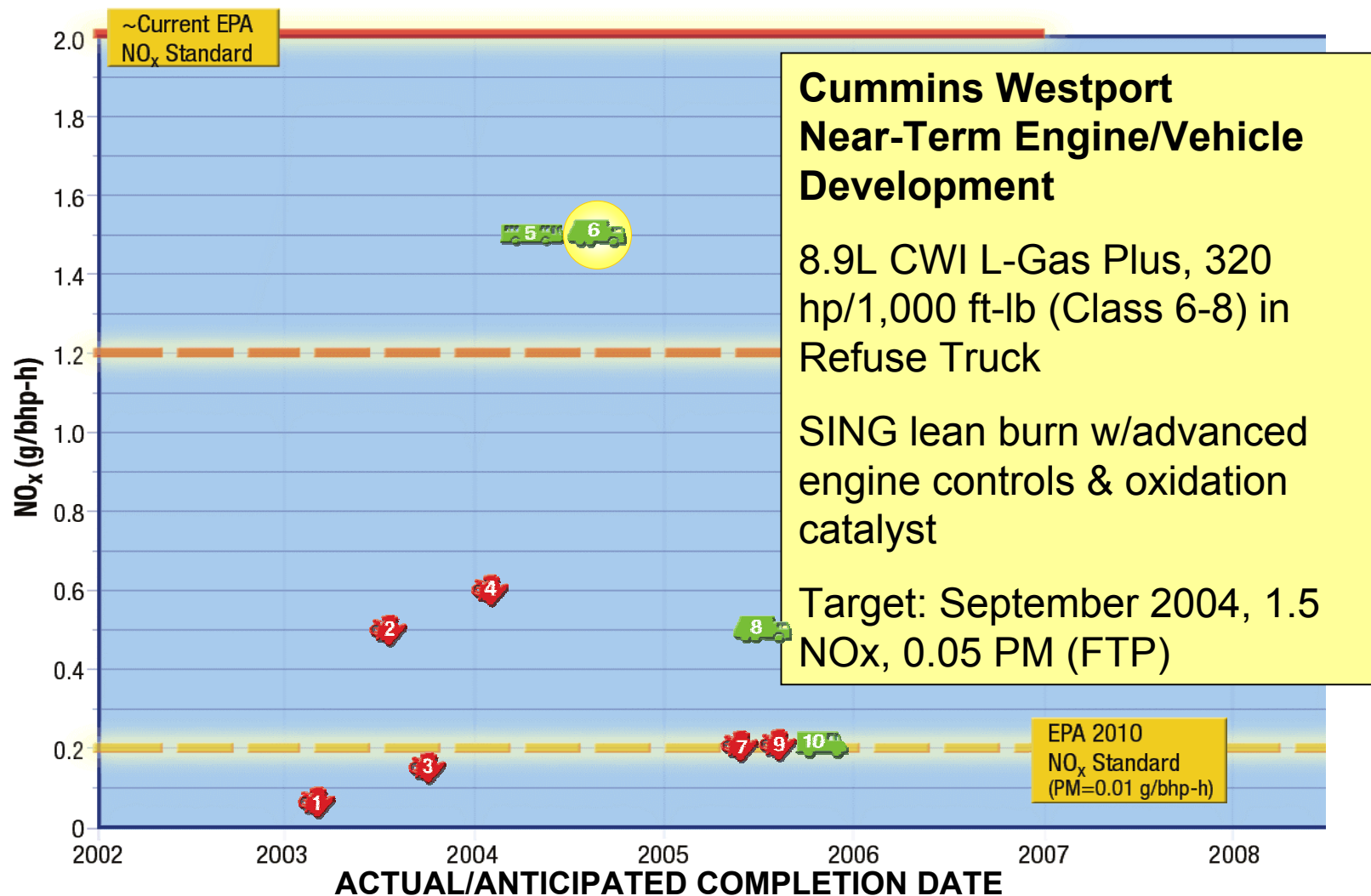
# NGNGV Projects



# NGNGV Projects

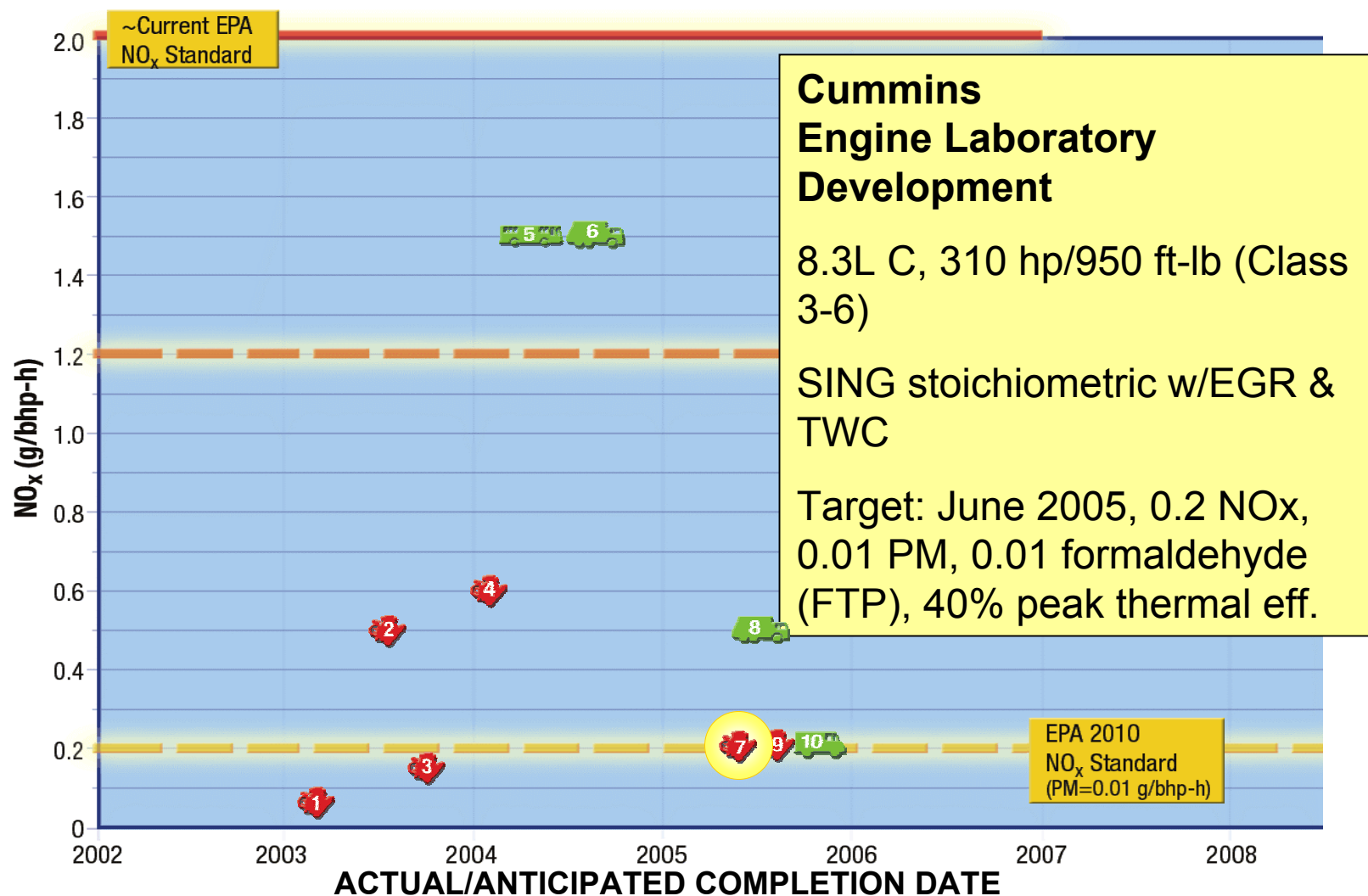


# NGNGV Projects



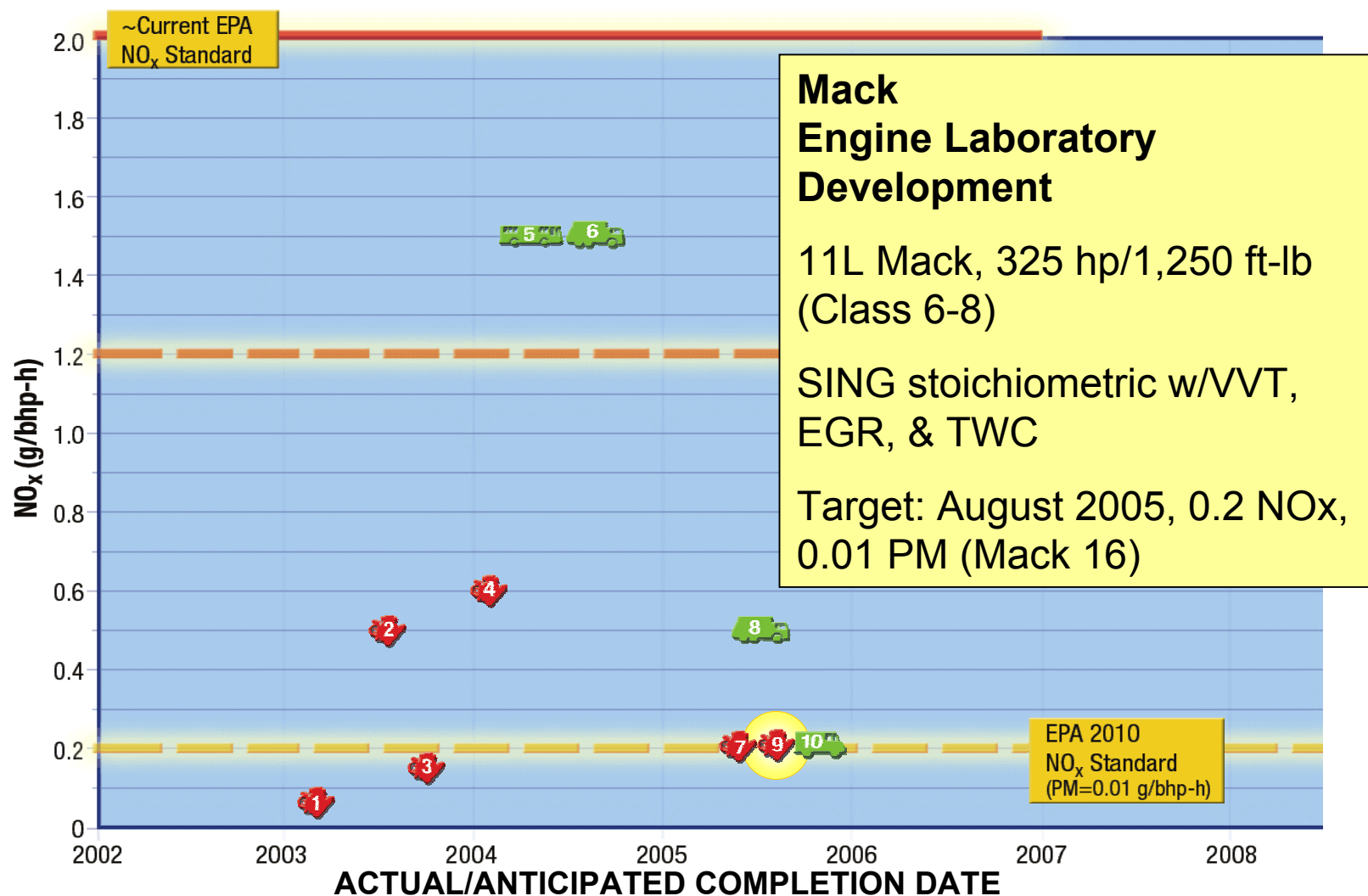


# NGNGV Projects

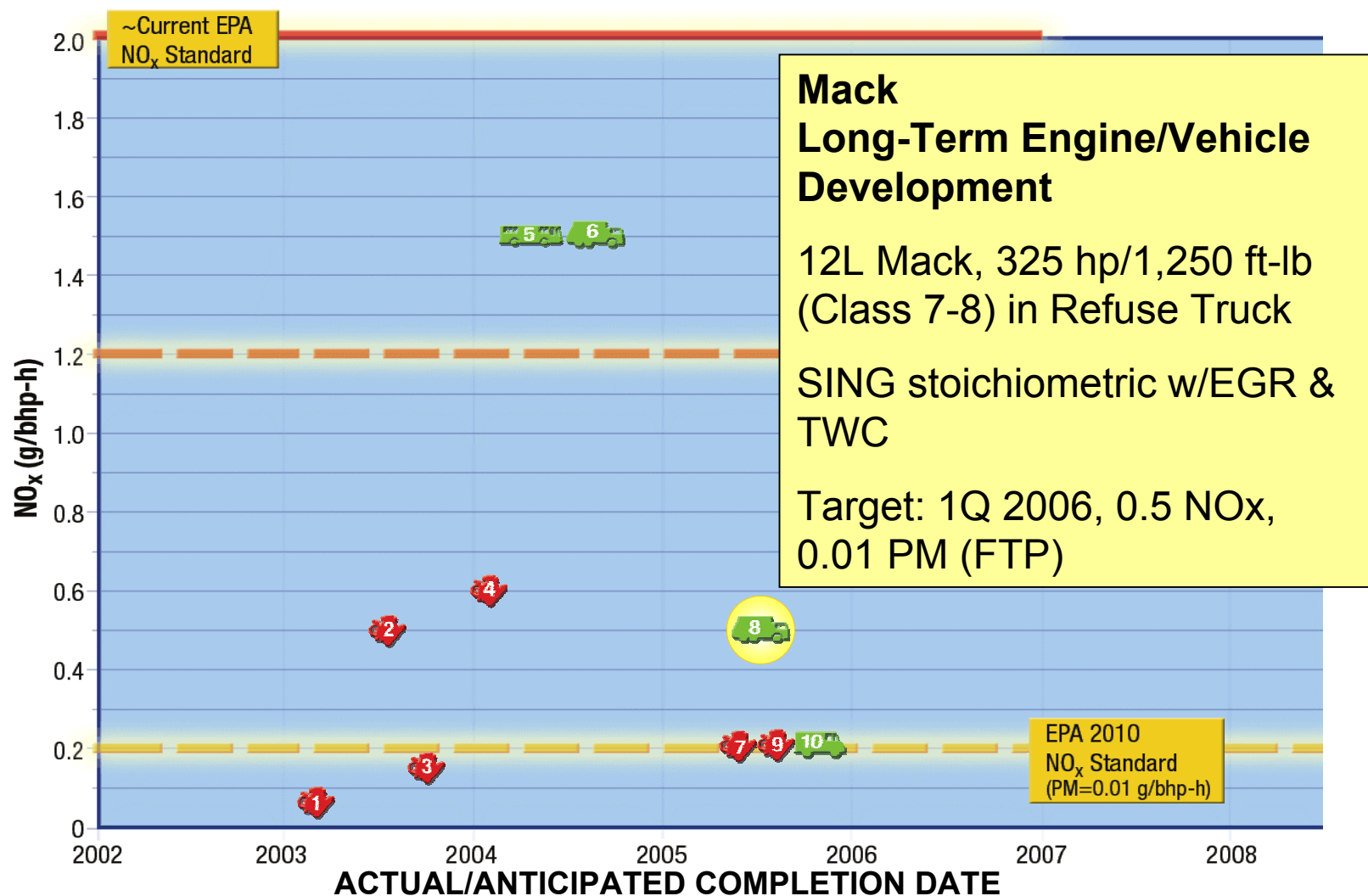




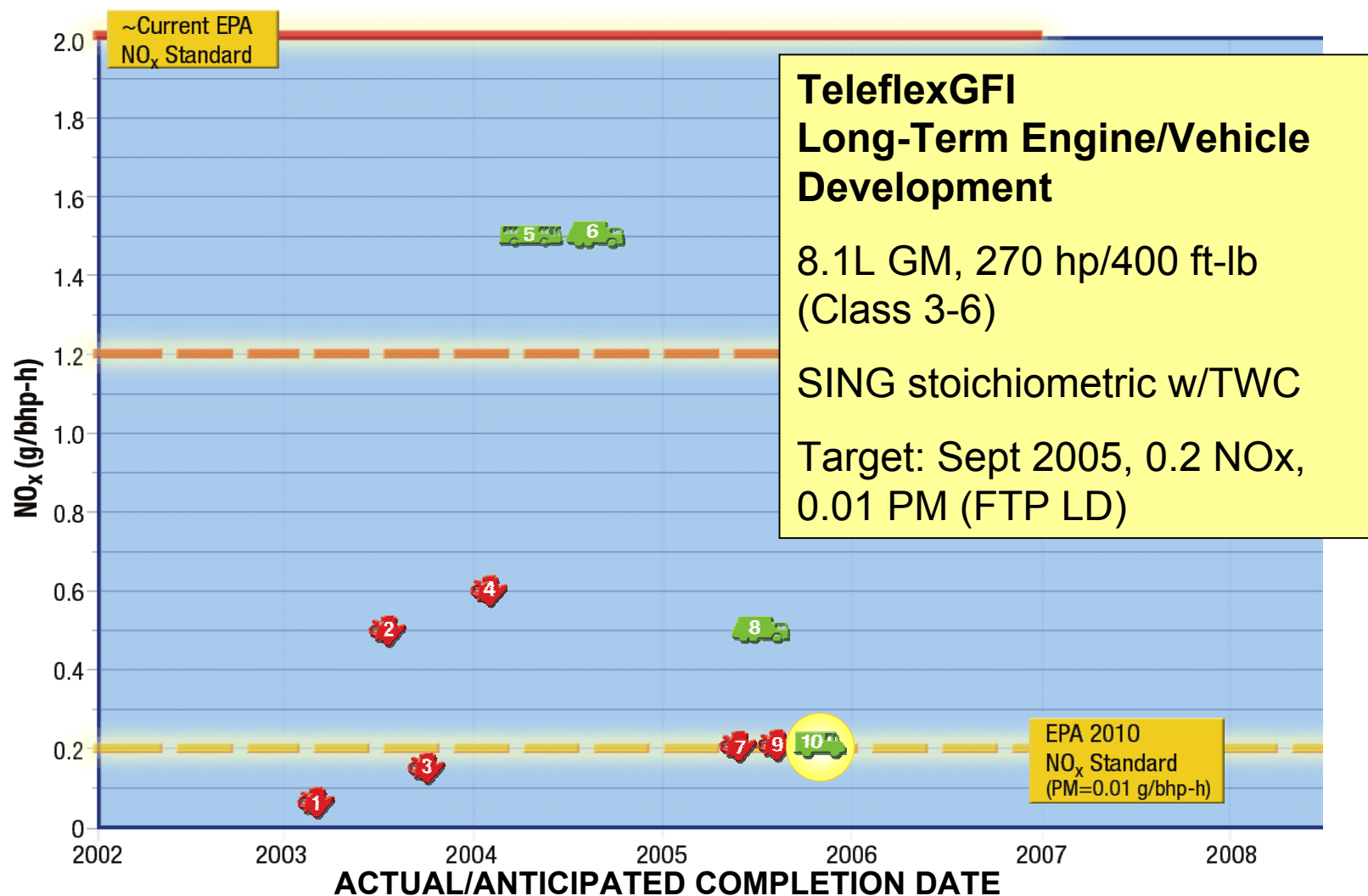
# NGNGV Projects



# NGNGV Projects



# NGNGV Projects



# NGNGV Program

SING development is progressing

Near-term commercial engines available soon

SI, EGR, TWC product aiming at 2010 stds

DING product laboratory demonstrated

Needs more R&D for 2010 capability